

Amendments to the Claims

This listing of claims will replace all prior version, and listings, of claims in the application:

Listing of Claims:

1. – 19. (Cancelled)

20. (Currently Amended) An apparatus ~~Apparatus~~ for enhancing the pitch cue of an audio signal perceived by a cochlear implant recipient, the audio signal being processed and input to an implant device of the recipient, the apparatus comprising:

means for filtering the audio signal to produce a filtered audio signal;

means for half-wave rectifying the filtered audio signal to produce a half-wave rectified signal; and

means for sampling the half-wave rectified signal at predetermined time intervals.

21. (Currently Amended) The apparatus ~~Apparatus~~ according to claim 20 wherein the sampling rate used in the sampling step is relatively high compared to the frequency components in the filtered audio signal.

22. (Currently Amended) The apparatus ~~Apparatus~~ according to claim 21 wherein the sampling rate is at least eight times the highest frequency component in the filtered audio signal.

23. (Cancelled)

24. (Currently Amended) An apparatus ~~Apparatus~~ for enhancing the pitch cue of an audio signal perceived by a cochlear implant recipient, the audio signal being processed and input to an implant device of the recipient, the apparatus comprising:

means for filtering the audio signal to produce a filtered audio signal;

means for half-wave rectifying the filtered audio signal to produce a half-wave rectified signal;

means for detecting the peak values of the half-wave rectified signal and resetting the detected peak values to produce a reset detected signal; and

means for sampling the reset detected signal at predetermined time intervals.

25. – 36. (Cancelled)

37. (Currently Amended) An apparatus ~~Apparatus~~ for enhancing the pitch cue of an audio signal perceived by a cochlear implant recipient, the audio signal being processed and input to an implant device of the recipient, the apparatus comprising:

means for filtering the audio signal to produce a filtered audio signal;

means for envelope detecting the filtered audio signal to produce an envelope detected signal;

comparator means for producing a gating signal having one of two Boolean states;

means for multiplying the gating signal with the envelope detected signal to produce a multiplied signal; and

means for sampling the multiplied signal at predetermined time intervals.

38. (Currently Amended) The apparatus ~~Apparatus~~ according to claim 37 wherein the means for filtering uses an in-phase filter means and a quadrature filter means such that the audio signal is filtered respectively into in-phase and quadrature-phase filtered components.

39. (Currently Amended) The apparatus ~~Apparatus~~ according to claim 38 wherein the means for envelope detecting uses quadrature envelope detection such that the envelope detected signal is produced using the in-phase and quadrature-phase filtered components of the audio signal.

40. (Currently Amended) The apparatus ~~Apparatus~~ according to claim 39 wherein the gating signal is produced from an in-phase filtered component output from the in-phase filter means.

41. (Currently Amended) An apparatus ~~Apparatus~~ for enhancing the pitch cue of an audio signal perceived by a cochlear implant recipient, the audio signal being processed and input to an implant device of the recipient, the apparatus comprising:

means for filtering the audio signal to produce a filtered audio signal;

means for envelope detecting the filtered audio signal to produce an envelope detected signal;

comparator means for producing a gating signal having one of two Boolean states;

means for multiplying the gating signal with the envelope detected signal to produce a multiplied signal; and

means for detecting the peak values of and resetting the multiplied signal to produce a peak detected and reset multiplied signal.

42. (Currently Amended) The apparatus ~~Apparatus~~ according to claim 41 further comprising sampling means for sampling the peak detected and reset multiplied signal.

43. (Currently Amended) The apparatus ~~Apparatus~~ according to claim 41 ~~or claim 42~~ wherein the envelope detection means comprises quadrature envelope detection means.

44. (Currently Amended) The apparatus ~~Apparatus~~ according to claim 43 wherein the filter means comprises in-phase filter means and quadrature-phase filter means.

45. (Currently Amended) The apparatus ~~Apparatus~~ according to claim 44 further comprising circuit means for producing the envelope detected signal based on values of the outputs to the in-phase filter means and quadrature-phase filter means.

46. (Currently Amended) The apparatus ~~Apparatus~~ according to claim 45 wherein an output from the in-phase filter means is input to the comparator means.

47. (Currently Amended) The apparatus ~~Apparatus~~ according to claim 42 ~~any one of claims 42 to 46~~ wherein the peak detected and reset multiplied signal is applied to apical electrode channels and to basal electrode channels.

48. (Currently Amended) The apparatus ~~Apparatus~~—according to claim 47 wherein the means for sampling samples at relatively high frequencies for use by apical electrode channels in order to obtain enhanced pitch cues corresponding to responses to low frequency signals.

49. (Currently Amended) The apparatus ~~Apparatus~~—according to claim 47 wherein the means for sampling samples at relatively low frequencies using envelope detection applied to basal electrode channels corresponding to responses to high frequency signals.

50. – 58. (Cancelled)

59. (Currently Amended) An apparatus ~~Apparatus~~—for enhancing the pitch cue of an audio signal perceived by a cochlear implant recipient, the audio signal being processed and input to an implant device of the recipient, the apparatus comprising:

means for filtering the audio signal to produce a filtered audio signal; and

means for sampling the filtered audio signal at predetermined time intervals to produce samples;

wherein the samples are synchronised with the filtered audio signal.

60. (Currently Amended) The apparatus ~~Apparatus~~—according to claim 59 further comprising clock synchroniser means that inputs a clock signal to the sampling means, the clock signal comprising bursts of pulses separated by a fixed time interval with the leading pulse in each burst of pulses being synchronised to the phase of the filtered audio signal.

61. (Currently Amended) The apparatus ~~Apparatus~~—according to claim 60 further comprising comparator means that receives the filtered audio signal and outputs to the clock synchroniser means an enabling signal representative of positive cycles of the filtered audio signal.

62. (Currently Amended) The apparatus ~~Apparatus~~—according to claim 61 wherein the leading pulse in each burst of pulses of the clock signal occurs at a fixed time interval after

the rising zero crossing of the filtered audio signal such that only positive cycles of the filtered audio signal are sampled.

63. (Currently Amended) The apparatus ~~Apparatus~~ according to claim 59 ~~any one of claims 59 to 62~~ further comprising half-wave rectifying means connected between the filter means and the sampling means for half-wave rectifying the filtered audio signal to produce a half-wave rectified signal, and thereafter the sampling means sampling the half-wave rectified signal at predetermined intervals to produce samples that are synchronised with the filtered audio signal.

64. (Currently Amended) An apparatus ~~Apparatus~~ for enhancing the pitch cue of an audio signal perceived by a cochlear implant recipient, the audio signal being processed and input to an implant device of the recipient, the apparatus comprising:

means for filtering the audio signal to produce a filtered audio signal;

means for envelope detecting the filtered audio signal to produce an envelope detected signal; and

means for sampling the envelope detected signal to produce samples;

wherein the samples of the envelope detected signal are synchronised with the filtered audio signal.

65. (Currently Amended) The apparatus ~~Apparatus~~ according to claim 64 wherein the envelope detection means comprises quadrature envelope detection means.

66. (Currently Amended) The apparatus ~~Apparatus~~ according to claim 65 wherein the filter means comprises in-phase filter means and quadrature-phase filter means.

67. (Currently Amended) The apparatus ~~Apparatus~~ according to claim 66 further comprising circuit means for producing the envelope detected signal based on values of the outputs to the in-phase filter means and quadrature-phase filter means.

68. (Currently Amended) The apparatus ~~Apparatus~~ according to claim 67 further comprising comparator means that receives an output of the in-phase filter means and

outputs to a clock synchroniser means an enabling signal representative of positive cycles of in-phase filtered components of the audio signal, said enabling signal enabling the clock synchroniser means.

69. (Currently Amended) The apparatus ~~Apparatus~~—according to claim 68 wherein the clock synchroniser means, once enabled, inputs a synchronised clock signal to the sampling means, the clock signal comprising bursts of pulses separated by a fixed time interval with the leading pulse in each burst of pulses being synchronised to the in-phase components of the filtered audio signal.

70. (Currently Amended) The apparatus ~~Apparatus~~—according to claim 69 wherein the leading pulse in each burst of pulses of the clock signal occurs at a fixed time interval after the rising zero crossing of the in-phase filtered output signal such that only positive cycles of the in-phase filtered components of the audio signal are sampled.

71. – 74. (Cancelled)